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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,697	08/28/2003	Satoru Ohishi	242158US3S	6746

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ALEXANDRIA, VA 22314

EXAMINER

BROOME, SAID A

ART UNIT	PAPER NUMBER
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2671

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/649,697

Applicant(s)

OHISHI, SATORU

Examiner

Said Broome

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 6, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negrelli et al. (US Patent 5,712,895) in view of Strobel (US Patent 6,650,724).

Negrelli et al. teaches what is disclosed in claims 1, 6, 11, and 16 except for the reconstruction unit that reconstructs the volume data of mask and subtraction images, the image processing unit that generates a 3D image of bone and/or soft tissue and one of a blood vessel, and an image synthesizing unit that synthesizes the two images. Negrelli et al. describes a storing unit that stores mask and contrast images corresponding to projection directions related to the object, which is illustrated in Figure 1 as element 42 and 70, and is described in column 2 lines 23-28, column 4 line 62 and column 5 lines 33-35. Negrelli et al. provides a description of a memory that stores the projection directions that relate to the image taken during rotations around the object. It is also described by Negrelli et al. that the forward images refer to the mask images, and the reverse image refer to the contrast images, in column 8 lines 5-7. Negrelli et al. also teaches a subtracting unit that generates subtraction image data by subtracting mask images from contrast images in column 2 lines 55-60 and is illustrated in element 86 of Figure 1. A display unit that displays the synthetic image is also explained by Negrelli et al. in column 8

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lines 5-7 and is illustrated as element 88 of Figure 1. Again, Negrelli et al. fails to teach the reconstruction unit that reconstructs the volume data of mask and subtraction images, the image processing unit that generates a 3D image of bone and/or soft tissue and one of a blood vessel, and the image synthesizing unit that synthesizes the two images. Strobel describes a reconstruction of a first set of volume data produced from mask images and a second set of volume data produced from fill images, or images with contrast agent also called contrast images, in column 1 lines 54-55. Strobel describes this reconstruction to be executed by means of a C-arm apparatus, in column 1 lines 12-16, which must contain a reconstruction unit to enable this 3D volume reconstruction. Strobel also describes generating one 3D image of a bone structure from the volume data of the mask image, and another 3D image of a blood vessel from the volume data of the contrast image in column 1 lines 12-16 and 52-55. It is known to one of ordinary skill in the art that mask images contain images of bone structure and/or tissues with the absence of a contrast agent, which is described by Strobel in column 1 lines 19-20. It is also known to one of ordinary skill in the art that contrast images contain images of blood vessels and are described by Strobel in column 1 lines 56-57. A synthetic image is generated by synthesizing the two 3D images and is described by Strobel in column 2 lines 31-40, which is illustrated in Figure 2. As previously stated, the generation of the 3D images are processed using a C-arm apparatus that comprises an image processing unit for image processing, and an image synthesizing unit for image synthesizing which is referenced by Strobel in column 1 lines 12-16 and is known in the art. Therefore it would have been obvious to one of ordinary skill in the art to combine the storing capability of several mask and contrast images, the generation of subtraction images by subtracting mask images from contrast images and combine it with a

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reconstruction unit that reconstructs 3D volume data of the mask and contrast images as taught by Strobel to produce two 3D images, one of which representing bone and/or tissue and the other displaying blood vessels in Negrelli et al.'s system. Motivation for this combination would produce a 3D digital subtraction image processing apparatus that improves the resolution and clarity of mask and contrast images by producing synthesized 3D images that provide a more realistic view of blood vessels for analysis.

Claims 2-5, 7-10, 12-15, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negrelli et al. (US Patent 5,712,895) in view of Strobel (US Patent 6,650,724), in further view of Vining (US Patent 5,782,762).

Negrelli et al. in view of Strobel teaches what is disclosed in claims 2-5, 7-10, 12-15, and 17-20 except for the generation of color 3D images which have independent colors as recited in claims 2, 3, 7, 8, 12, 13, 17 and 18, the processing of the image using a volume rendering process as recited in claims 4, 9, 14 and 19 and the ability of the user to select whether the mask, contrast or synthetic image is displayed as recited in claims 5, 10, 15 and 20. Vining describes generating a synthetic image in which the images are shown with different colors in column 20 lines 37-39. It is also described by Vining that the images are given colors independent of each other in column 3 lines 42-44. Vining describes generating the data of the images using a volume rendering process in column 13 lines 16-34, and shows that the 3D images are generated using a volume rendering technique that is known to one of ordinary skill in the art. Vining also describes the ability of the user to select a mask, contrast or synthetic image in column 3 lines 24-31. Individual 3D images are captured as described in column 18 lines 59-60, and the user is

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provided with the option to select several views of those 3D images, which would also allow the user to select one particular image of interest. Therefore it would have obvious to one of ordinary skill in the art to combine the teachings of Vining including the display of a synthetic image which contains independent colors for each 3D image that comprises it, the generation of image data using volume rendering and the enablement of the display of certain 3D images by the user in the combined system disclosed by Negrelli et al. and Strobel. Motivation for this combination would produce a 3D digital subtraction image processing apparatus that improves resolution and clarity of mask and contrast images by producing synthesized 3D images in color that provide a more realistic observation of blood vessels for analysis.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: 3D Digital Subtraction Angiography Image Processing Apparatus.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571) 272-2931. The examiner can normally be reached between 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is (571) 272-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S.Broome *SB*
8/17/2005


8/18/05
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SUPERVISORY PATENT EXAMINER
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